

1 **Amendment to the Claims**

2 **In the Claims:**

3 Please cancel Claims 39-44.

4 Please amend Claims 1, 5, 22-24, 25, 33-35, and 47-51 as follows:

5 1. (Currently Amended) A bending die for use in sheet metal forming, comprising:

6 (a) a first movable component including a first working surface, the first movable  
7 component and the first working surface extending longitudinally relative to a longitudinal axis of the  
8 bending die, the first working surface being generally planar and comprising a first inner edge  
9 extending longitudinally relative to the longitudinal axis of the bending die;

10 (b) a second movable component including a second working surface, the second  
11 movable component and the second working surface extending longitudinally relative to the  
12 longitudinal axis of the bending die and disposed adjacent to said first working surface, the second  
13 working surface being generally planar and comprising a second inner edge extending longitudinally  
14 relative to the longitudinal axis of the bending die, the first inner edge and the second inner edge  
15 being oriented substantially adjacent to one another in a facing relationship; and

16 (c) a frame configured to provide support for said first and second ~~working~~  
17 ~~surfaces~~ movable component, while enabling said first and second working surfaces to move relative  
18 to the frame, such that a substantially fixed separation between the first inner edge and the second  
19 inner edge is maintained, regardless of a rotational angular displacement of either of the first and  
20 second movable components ~~working surfaces~~, the frame supporting the first and second movable  
21 components using at least one configuration selected from the group consisting essentially of:

22 (i) a first configuration wherein each of said first and second movable  
23 components comprises at least one sector gear, each such sector gear engaging a linear rack gear that  
24 is attached to the frame, each sector gear and linear rack gear in combination supporting one of the  
25 first and second movable components, such that each linear rack gear is oriented parallel to each  
26 other linear rack gear supporting one of the first and second movable components; and

27 (ii) a second configuration wherein each of said first and second movable  
28 components includes a bearing surface disposed at each end thereof, each such bearing surface at one  
29 end of the first and second movable components rotatably engaging one opening in the frame that  
30 fully encloses the bearing surfaces, and each such bearing surface at the other end of the first and

1 second movable components engaging another opening in the frame that fully encloses the bearing  
2 surfaces, each said opening constraining the first and second movable components so that as the first  
3 and second movable components move, the substantially fixed separation between the first inner edge  
4 and the second inner edge is retained, each of said openings thereby supporting the ends of the first  
5 and second movable components, as the first and second movable components pivot relative to each  
6 other.

7 2. (Previously Presented) The bending die of Claim 1, wherein said adjacent first inner edge  
8 and second inner edge are separated by a substantial gap having a predefined width, said substantial  
9 gap affecting a configuration of the sheet metal formed with the bending die.

10 3. (Previously Presented) The bending die of Claim 1, wherein the adjacent first inner edge  
11 and second inner edge substantially abut one another.

12 4. (Previously Presented) The bending die of Claim 1, wherein said frame comprises a first  
13 section and a second section, a position of said first section relative to said second section being  
14 adjustable to enable a width of a gap separating the adjacent first inner edge and second inner edge to  
15 be adjusted to a desired dimension.

16 5. (Currently Amended) The bending die of Claim 1, wherein for each working surface:

17 (a) a center of rotation is associated with the working surface;

18 (b) relative to a portion of the working surface that is in contact with [[the]] a  
19 metal sheet during metal forming, the center of rotation is disposed proximate to an inner edge of said  
20 portion; and

21 (c) regardless of the rotational angular displacement of the working surface, the  
22 center of rotation remains substantially fixed relative to each working surface.

23 6. (Original) The bending die of Claim 1, further comprising a hinge assembly disposed at  
24 each end of the first and second working surfaces, each hinge assembly pivotally coupling said first  
25 and second working surfaces together, such that a rotational displacement of one of said first and  
26 second working surfaces results in a corresponding rotational displacement of the other one of said  
27 first and second working surfaces, through an opposite rotational direction.

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1           7. (Previously Presented) The bending die of Claim 47, wherein at least one hinge assembly  
2 includes a return spring that applies a restoring force to return said first and second working surfaces  
3 to their respective original positions after the sheet metal has been deformed in the bending die, and  
4 after a force is no longer applied to deform the sheet metal and the sheet metal has been removed  
5 from the bending die.

6           8. (Previously Presented) The bending die of Claim 47, wherein each hinge assembly  
7 comprises a pair of sector gears, and a pair of rack gears that are mounted on the frame, each sector  
8 gear engaging a different rack gear and being mounted at an end of different ones of the first and  
9 second working surfaces.

10          9. (Original) The bending die of Claim 8, wherein said frame includes a generally U-shaped  
11 portion defined by support members disposed adjacent to the end of one of the first and second  
12 working surfaces, such that each rack gear is attached to a different support member.

13          10. (Previously Presented) The bending die of Claim 47, wherein said first and second  
14 working surfaces are each generally rectangular in shape.

15          11. (Previously Presented) The bending die of Claim 47, wherein each hinge assembly  
16 further comprises a first link and a second link joined by a pivot shaft, the first link being coupled to  
17 one sector gear, and the second link being coupled to another sector gear.

18          12. (Original) The bending die of Claim 1, wherein each of said first and second working surfaces  
19 comprises an angled upper surface having a shape selected to facilitate over-bending of the sheet metal.

20          13. (Original) The bending die of Claim 1, further comprising a resist element that applies a  
21 resisting force to said first and second working surfaces, the resisting force countering at least in part  
22 a force applied to deform the sheet metal.

23          14. (Original) The bending die of Claim 13, wherein the resist element comprises at least one  
24 of a stripper, a spring, an elastomeric material, a hydraulic component, a collapsible support, a  
25 movable support, and a pneumatic component.

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1           15. (Original) The bending die of Claim 13, wherein said resist element comprises:

2                   (a)     a channel, said channel having a dimension substantially equal to said fixed  
3 separation;

4                   (b)     an elongate block partially disposed in said channel, said elongate block  
5 having a dimension smaller than said fixed separation; and

6                   (c)     a spring disposed in said channel so as to apply a restoring force against said  
7 elongate block in opposition to a deformation of the metal sheet into the channel, such that said  
8 elongate block is returned to an original position after the metal sheet is removed following the  
9 deformation of the metal sheet.

10           16. (Original) The bending die of Claim 1, further comprising a sector gear coupled to each  
11 one of said first and second working surfaces.

12           17. (Original) The bending die of Claim 16, further comprising a prime mover, and a  
13 plurality of driven gears configured to drivingly couple with the prime mover, each driven gear being  
14 disposed to engage one of said sector gears, such that as each driven gear is rotated, the  
15 corresponding sector gear is rotated.

16           18. (Original) The bending die of Claim 17, further comprising a plurality of shafts, such  
17 that each driven gear is coupled to one of said plurality of shafts.

18           19. (Original) The bending die of Claim 16, wherein said frame comprises a plurality of rack  
19 gears, such that each sector gear engages a different rack gear.

20           20. (Original) The bending die of Claim 1, wherein each of said first and second working  
21 surfaces comprises an elongate sector gear, and wherein said frame comprises opposed rack gears,  
22 such that the elongate sector gear on each one of said first and second working surfaces engages a  
23 different rack gear.

24           21. (Original) The bending die of Claim 1, further comprising a piston and a cylinder  
25 assembly disposed adjacent to each of said first and second working surfaces, such that each one of  
26 said first and second working surfaces is coupled to a different piston and cylinder assembly, each  
27 piston and cylinder assembly applying one of a driving force and a resisting force to a different one  
28 of the first and second working surfaces.

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1           22. (Currently Amended) The bending die of ~~Claim 51~~ Claim 1, wherein each of said first  
2 and second working surfaces comprises a wing, such that each wing is coupled to a different piston  
3 and cylinder assembly.

4           23. (Currently Amended) The bending die of ~~Claim 51~~ Claim 1, wherein each piston and  
5 cylinder assembly comprises one of a hydraulic system, a pneumatic system, and a mechanical  
6 system.

7           24. (Currently Amended) The bending die of ~~Claim 51~~ Claim 1, wherein each piston and  
8 cylinder assembly is coupled to an actuator that controls a movement of said first and second working  
9 surfaces.

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1           25. (Currently Amended) A press brake for use in sheet metal forming, comprising:

2           (a)     a first die extending longitudinally relative to a longitudinal axis of the press  
3 brake, said first die including a working surface configured to support a work piece, said working  
4 surface having an inner edge and an outer edge and being generally planar;

5           (b)     a second die extending longitudinally relative to the longitudinal axis of the  
6 press brake and disposed adjacent to said first die, said second die including a working surface  
7 configured to support a work piece, said working surface having an inner edge and an outer edge and  
8 being generally planar; and

9           (c)     a frame coupled to and supporting said first and second dies, while enabling  
10 said first and second dies to move relative to the frame, such that each die is able to rotate about a  
11 different respective center of rotation, and so that regardless of any rotational angular displacement of  
12 the die relative to the frame, the inner edge of the die is disposed closer to the respective center of  
13 rotation of the die than the outer edge of the die; the frame supporting the first and second dies using  
14 at least one configuration selected from the group consisting essentially of:

15           (i)     a first configuration wherein each of said first and second dies  
16 comprises at least one sector gear, each such sector gear engaging a linear rack gear that is attached to  
17 the frame, each sector gear and linear rack gear in combination supporting one of the first and second  
18 dies, such that each linear rack gear is oriented parallel to each other linear rack gear supporting one  
19 of the first and second dies; and

20           (ii)    a second configuration wherein each of said first and second dies  
21 includes a bearing surface disposed at each end thereof, each such bearing surface at one end of the  
22 first and second dies rotatably engaging one opening in the frame that fully encloses the bearing  
23 surfaces, and each such bearing surface at the other end of the first and second dies engaging another  
24 opening in the frame that fully encloses the bearing surfaces, each said opening constraining the first  
25 and second dies so that as the first and second movable components move, the substantially fixed  
26 separation between the first inner edge and the second inner edge is retained, each of said openings  
27 thereby supporting the ends of the first and second dies, as the first and second dies pivot relative to  
28 each other.

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1           26. (Original) The press brake of Claim 25, wherein a substantially fixed separation is  
2 maintained between adjacent inner edges of the first and second dies, regardless of the rotational  
3 angular displacement of either one of the first and second dies about its respective center of rotation.

4           27. (Original) The press brake of Claim 26, wherein said frame is adjustable, so that said  
5 substantially fixed separation can be adjusted to a desired dimension, the desired dimension being  
6 substantially maintained regardless of the rotational angular displacement of either of the first and  
7 second dies.

8           28. (Previously Presented) The press brake of Claim 25, further comprising at least one  
9 spring operatively coupled to at least one of the first and the second dies, producing a restoring force  
10 that acts to return said first die and said second die to their respective original positions, after they  
11 have been rotatably displaced.

12           29. (Original) The press brake of Claim 25, further comprising a hinge assembly disposed at  
13 each end of the first and second dies, said hinge assemblies pivotally coupling said first and second  
14 dies together, such that a displacement of one of said first and second dies results in a corresponding  
15 displacement of the other of said first and second dies.

16           30. (Original) The press brake of Claim 29, wherein each hinge assembly comprises a pair of  
17 sector gears, and a pair of rack gears mounted on the frame, each sector gear engaging a different  
18 rack gear and being mounted at an end of different ones of the first and second dies.

19           31. (Original) The press brake of Claim 25, wherein each of said first and second dies  
20 comprises an elongate sector gear, and wherein said frame comprises opposed rack gears, each  
21 elongate sector gear of said first and second dies engaging a different rack gear.

22           32. (Original) The press brake of Claim 25, further comprising means for applying a force to  
23 each of said first and second dies, the force being applied for one of:

24                   (a) countering at least in part a force applied to deform the sheet metal; and

25                   (b) causing the rotational angular displacement of said first and second dies, in  
26 order to achieve a desired deformation of the sheet metal.

27           33. (Currently Amended) The press brake of ~~Claim 50~~ Claim 25, wherein each of said first  
28 and second dies comprises a wing, each wing being coupled to said means for applying a force.

29           34. (Currently Amended) The press brake of ~~Claim 50~~ Claim 25, wherein said means  
30 comprises one of a spring, an elastomeric material, a hydraulic system, and a pneumatic system.

1           35. (Currently Amended) The press brake of ~~Claim 50~~ Claim 25, wherein each of said first  
2 and second dies comprises a sector gear, and wherein said means comprises a prime mover and a  
3 plurality of driven gears that are drivingly coupled with the prime mover, to drivingly rotate the  
4 sector gear of each of said first and second dies.

5           36. (Original) The press brake of Claim 25, wherein each of said first and second dies  
6 comprises a sector gear, and said frame comprises a rack gear configured to engage each of said first  
7 and second dies.

8           37.-38. (Previously Canceled)

9           39.-44. (Currently Canceled)

10          45.-46. (Previously Canceled)

11          47. (Currently Amended) A bending die for use in sheet metal forming, comprising:

12           (a) a first working surface extending longitudinally relative to a longitudinal axis  
13 of the bending die;

14           (b) a second working surface extending longitudinally relative to the longitudinal  
15 axis of the bending die and disposed adjacent to said first working surface;

16           (c) a frame configured to provide support for said first and second working  
17 surfaces, while enabling said first and second working surfaces to move relative to the frame, such  
18 that a substantially fixed separation between adjacent edges of the first and second working surfaces  
19 is maintained, regardless of a rotational angular displacement of either of the first and second  
20 working surfaces; and

21           (d) a hinge assembly disposed at each latitudinal end of the first and second  
22 working surfaces, each hinge assembly pivotally coupling said first and second working surfaces  
23 together, such that a rotational displacement of one of said first and second working surfaces results  
24 in a corresponding rotational displacement of the other one of said first and second working surfaces,  
25 through an opposite rotational direction, each such hinge assembly being disposed generally  
26 orthogonal to the longitudinal axis of the bending die.

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1 48. (Currently Amended) A bending die for use in sheet metal forming, comprising:

2 (a) a first working surface extending longitudinally relative to a longitudinal axis  
3 of the bending die, a sector gear being coupled to said first working surface;

4 (b) a second working surface extending longitudinally relative to the longitudinal  
5 axis of the bending die and disposed adjacent to said first working surface, a sector gear being  
6 coupled to said second working surface;

7 (c) a frame configured to provide support for said first and second working  
8 surfaces, while enabling said first and second working surfaces to move relative to the frame, such  
9 that a substantially fixed separation between adjacent edges of the first and second working surfaces  
10 is maintained, regardless of a rotational angular displacement of either of the first and second  
11 working surfaces; and

12 (d) a hinge assembly disposed at an end of the first and second working surfaces,  
13 the hinge assembly pivotally coupling said first and second working surfaces together, such that a  
14 rotational displacement of one of said first and second working surfaces results in a corresponding  
15 rotational displacement of the other one of said first and second working surfaces, through an  
16 opposite rotational direction, the hinge assembly comprising a first link and a second link joined by a  
17 pivot shaft, the first link being coupled to the sector gear coupled to the first working surface, and the  
18 second link being coupled to the sector gear coupled to the second working surface ~~a prime mover;~~

19 ~~and~~

20 ~~(e) a plurality of driven gears configured to drivingly couple with the prime~~  
21 ~~mover, each driven gear being disposed to engage one of said sector gears, such that as each driven~~  
22 ~~gear is rotated, the corresponding sector gear is rotated.~~

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1           49. (Currently Amended) A bending die for use in sheet metal forming, comprising:

2                   (a)     a first working surface extending longitudinally relative to a longitudinal axis  
3 of the bending die, ~~the first working surface comprising an elongate sector gear;~~

4                   (b)     a second working surface extending longitudinally relative to the longitudinal  
5 axis of the bending die and disposed adjacent to said first working surface, ~~the second working~~  
6 ~~surface comprising an elongate sector gear; and~~

7                   (c)     a frame configured to provide support for said first and second working  
8 surfaces, while enabling said first and second working surfaces to move relative to the frame, such  
9 that a substantially fixed separation between adjacent edges of the first and second working surfaces  
10 is maintained, regardless of a rotational angular displacement of either of the first and second  
11 working surfaces, ~~said frame comprising opposed rack gears, such that the elongate sector gear on~~  
12 ~~each one of said first and second working surfaces engages a different rack gear; and~~

13                   (d)     a hinge assembly disposed at each latitudinal end of the first and second  
14 working surfaces, each hinge assembly pivotally coupling said first and second working surfaces  
15 together, such that a rotational displacement of one of said first and second working surfaces results  
16 in a corresponding rotational displacement of the other one of said first and second working surfaces,  
17 through an opposite rotational direction, each hinge assembly comprising a pair of sector gears that  
18 are physically linked together, and a pair of rack gears that are mounted on the frame, each sector  
19 gear engaging a different rack gear and being mounted at an end of different ones of the first and  
20 second working surfaces.

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1           50. (Currently Amended) A press brake for use in sheet metal forming, comprising:

2           (a)     a first die extending longitudinally relative to a longitudinal axis of the press  
3 brake, said first die including a working surface configured to support a work piece, said working  
4 surface having an inner edge and an outer edge;

5           (b)     a second die extending longitudinally relative to the longitudinal axis of the  
6 press brake and disposed adjacent to said first die, said second die including a working surface  
7 configured to support a work piece, said working surface having an inner edge and an outer edge; and

8           (c)     a frame coupled to and supporting said first and second dies, while enabling  
9 said first and second dies to move relative to the frame, such that each die is able to rotate about a  
10 different respective center of rotation, and so that regardless of any rotational angular displacement of  
11 the die relative to the frame, the inner edge of the die is disposed closer to the respective center of  
12 rotation of the die than the outer edge of the die, wherein said frame comprises a first section and a  
13 second section, a position of said first section relative to said second section being adjustable to  
14 enable a width of a gap separating adjacent inner edges of the working surfaces of the first and  
15 second dies to be adjusted to a desired dimension; and

16           (d) ~~— means for applying a force to each of said first and second dies, the force being~~  
17 ~~applied for one of:~~

18                   (i) ~~— countering at least in part a force applied to deform the sheet metal; and~~

19                   (ii) ~~— causing the rotational angular displacement of said first and second~~  
20 ~~dies, in order to achieve a desired deformation of the sheet metal.~~

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1           51. (Currently Amended) A bending die for use in sheet metal forming, comprising:

2                   (a)     a first working surface extending longitudinally relative to a longitudinal axis  
3 of the bending die;

4                   (b)     a second working surface extending longitudinally relative to the longitudinal  
5 axis of the bending die and disposed adjacent to said first working surface; and

6                   (c)     a frame configured to provide support for said first and second working  
7 surfaces, while enabling said first and second working surfaces to move relative to the frame, such  
8 that a substantially fixed separation between adjacent edges of the first and second working surfaces  
9 is maintained, regardless of a rotational angular displacement of either of the first and second  
10 working surfaces, wherein said frame comprises a first section and a second section, a position of  
11 said first section relative to said second section being adjustable to enable a width of a gap separating  
12 adjacent inner edges of the first and second working surfaces to be adjusted to a desired dimension;  
13 and

14                   ~~(d)     a piston and a cylinder assembly disposed adjacent to each of said first and~~  
15 ~~second working surfaces, such that each one of said first and second working surfaces is coupled to a~~  
16 ~~different piston and cylinder assembly, each piston and cylinder assembly applying one of a driving~~  
17 ~~force and a resisting force to a different one of the first and second working surfaces.~~

18           52. (Previously Presented) A bending die for use in sheet metal forming, comprising:

19                   (a)     a first working surface extending longitudinally relative to a longitudinal axis  
20 of the bending die;

21                   (b)     a second working surface extending longitudinally relative to the longitudinal  
22 axis of the bending die and disposed adjacent to said first working surface; and

23                   (c)     a frame configured to provide support for said first and second working  
24 surfaces, while enabling said first and second working surfaces to move relative to the frame, such  
25 that a substantially fixed separation between adjacent edges of the first and second working surfaces  
26 is maintained, regardless of a rotational angular displacement of either of the first and second  
27 working surfaces, said frame comprising a first section and a second section, a position of said first  
28 section relative to said second section being adjustable to enable a width of a gap separating the  
29 adjacent edges of said first and second working surfaces to be adjusted to a desired dimension.